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The Engineering Society For Advancing Mobility Land Sea Air and Space®

400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 4340C

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Superseding AMS 4340B

ALUMINUM ALLOY EXTRUSIONS
6.2Zn - 2.3Cu - 2.2Mg - 0.12Zr (7050-T76511)
Solution Heat Treated, Stress Relieved, and Overaged

UNS A97050

1. SCOPE:

1.1 Form: This specification covers an aluminum alloy in the form of extruded bars, rods, shapes, and tubing.

1.2 Application: Primarily for structural applications requiring high tensile properties and good exfoliation corrosion resistance.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2205 - Tolerances, Aluminum Alloy and Magnesium Alloy Extrusions
MAM 2205 - Tolerances, Metric, Aluminum Alloy and Magnesium Alloy Extrusions
AMS 2350 - Standards and Test Methods
AMS 2355 - Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings
MAM 2355 - Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings, Metric (SI) Units

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM B594 - Ultrasonic Inspection of Aluminum-Alloy Products for Aerospace Applications
ASTM B660 - Packaging/Packing of Aluminum and Magnesium Products
ASTM G34 - Exfoliation Corrosion Susceptibility in 2XXX and 7XXX Series Aluminum Alloys (EXCO Test)

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Specifications:

MIL-H-6088 - Heat Treatment of Aluminum Alloys

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined in accordance with AMS 2355 or MAM 2355:

	min	max
Zinc	5.7	6.7
Copper	2.0	2.6
Magnesium	1.9	2.6
Zirconium	0.08	0.15
Iron	--	0.15
Silicon	--	0.12
Manganese	--	0.10
Titanium	--	0.06
Chromium	--	0.04
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 Condition: Solution heat treated, stress relieved by stretching to produce a nominal permanent set of 1.5%, but not less than 1% nor more than 3%, and precipitation treated. Solution and precipitation heat treatments shall be performed in accordance with MIL-H-6088.

3.2.1 Extrusions shall be supplied with an as-extruded surface finish; light polishing to remove minor surface imperfections is permissible provided such imperfections can be removed within the dimensional tolerances.

3.2.2 The product may receive minor straightening, after stretching, of an amount necessary to meet the requirements of 3.5.

3.3 Properties: Product 5.000 inches (127.00 mm) and under in nominal diameter or least thickness (wall thickness of tubing) shall conform to the following requirements, determined in accordance with AMS 2355 or MAM 2355; requirements for product over 5.000 inches (127.00 mm) in nominal diameter or least thickness (wall thickness of tubing) shall be as agreed upon by purchaser and vendor:

3.3.1 Tensile Properties: Shall be as follows, determined on specimens as in Ø 4.3.1 taken in the longitudinal direction:

TABLE I

Nominal Diameter or Least Thickness (Wall Thickness of Tubing) Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, minimum	Elongation in 4D %, minimum
Up to 0.499, incl	77,000	68,000	7
Over 0.499 to 5.000, incl	79,000	69,000	7

TABLE I (SI)

Nominal Diameter or Least Thickness (Wall Thickness of Tubing) Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, minimum	Elongation in 4D %, minimum
Up to 12.67, incl	531	469	7
Over 12.67 to 127.00, incl	545	476	7

3.3.2 Corrosion Resistance: Resistance to stress-corrosion cracking and to exfoliation-corrosion shall be acceptable if the extrusions conform to the requirements of 3.3.2.1 and 3.3.2.2.

3.3.2.1 Electrical Conductivity: Electrical conductivity shall be 39.0% International Annealed Copper Standard (IACS) (22.6 MS/m) or greater, determined on specimens as in 4.3.2.

3.3.2.2 Stress-Corrosion Susceptibility Factor (SCF): If the electrical Ø conductivity is 37.0 to 38.9% IACS (21.5 to 22.6 MS/m), the SCF shall be not greater than 39.0 (270), determined by subtracting the electrical conductivity, AA.A IACS (12 times BB.B MS/m) from the longitudinal yield strength, XX.X ksi (YYY MPa).

Examples:

Inch/Pound Units	78.0 ksi - 37.5% IACS = 40.5	Unacceptable
	74.0 ksi - 38.5% IACS = 35.5	Acceptable
SI Units	538 MPa - (12 X 21.8 MS/m) = 276	Unacceptable
	510 MPa - (12 X 22.3 MS/m) = 242	Acceptable

3.3.2.3 Extrusions not conforming to 3.3.2.1 or 3.3.2.2 may be given additional precipitation heat treatment and retested to determine conformance to 3.3.1 and 3.3.2.1 or 3.3.2.2.

3.3.3 Exfoliation-Corrosion Resistance: Specimens cut from extrusions shall not exhibit exfoliation corrosion, at a T/10 plane, greater than that illustrated by photograph B, Figure 2, of ASTM G34.

3.3.4 Stress-Corrosion Resistance: Specimens cut from extrusions, 0.750 inch (19.05 mm) and over in nominal diameter or least thickness, shall show no evidence of stress corrosion cracking when stressed in the short-transverse direction at 17,000 psi (117 MPa).

3.4 Quality: Extrusions, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the extrusions.

3.4.1 When specified, bars, rods, and shapes 0.500 inch (12.70 mm) and over in nominal diameter or least thickness shall be subjected to ultrasonic inspection in accordance with ASTM B594.

3.4.1.1 Each bar, rod, or shape weighing 600 pounds (272 kg) and under and having a maximum width-to-thickness ratio of 10:1 shall meet the requirements for ultrasonic class as follows:

Nominal Thickness		Ultrasonic Class
Inches	Millimetres	
0.500 - 1.500, excl	12.70 - 38.10, excl	B
1.500 and over	38.10 and over	A

3.4.1.2 The ultrasonic class for extrusions weighing over 600 pounds (272 kg) or in excess of a 10:1 maximum width-to-thickness ratio shall be as agreed upon by purchaser and vendor.

3.5 Tolerances: Shall conform to all applicable requirements of AMS 2205 or MAM 2205.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of extrusions shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the extrusions conform to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for composition (3.1), tensile properties (3.3.1), corrosion resistance (3.3.2), tolerances (3.5) and, when specified, ultrasonic inspection (3.4.1) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for exfoliation-corrosion resistance (3.3.3) and stress-corrosion resistance (3.3.4) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling: Shall be in accordance with AMS 2355 or MAM 2355 and the following:

4.3.1 For Tensile Properties: From extrusions having a nominal weight of less Ø than 1 pound/linear foot (1.5 kg/m), one sample shall be selected from each lot weighing 1000 pounds (454 kg) or less; from lots weighing more than 1000 pounds (454 kg), one additional sample shall be taken from each 1000 pounds (454 kg) or fraction thereof in excess of the first 1000 pounds (454 kg). From extrusions having a nominal weight of 1 pound/linear foot (1.5 kg/m) or over, one sample shall be taken from each lot consisting of 1000 feet (305 m) or less; from lots consisting of more than 1000 feet (305 m), one additional sample shall be taken for each 1000 feet (305 m) or fraction thereof in excess of the first 1000 feet (305 m). Only one sample shall be taken from any one piece when more than one piece is available.

4.3.2 For Electrical Conductivity: Specimens for electrical conductivity Ø testing (3.3.2.1) shall be the samples used for tensile testing. Electrical conductivity shall be determined on the surface of test specimens 0.100 inch (2.54 mm) and under in nominal diameter and subsurface on test specimens over 0.100 inch (2.54 mm) in nominal thickness after removal of approximately 10% of the sample thickness.

4.4 Reports:

4.4.1 The vendor of extrusions shall furnish with each shipment a report stating that the extrusions conform to the chemical composition, showing the results of tests on each lot to determine conformance to the other acceptance test requirements, and stating that the extrusions conform to the other technical requirements of this specification. This report shall include the purchase order number, inspection lot number, AMS 4340C, size or section identification number, and quantity.